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(54) A novel discontinuous adhesive surface.

(57) Novel tapes or bandages comprising a backing material carrying a discontinuous adhesive layer on a surface thereof, the discontinuous adhesive layer consisting essentially of spaced small individual adhesive deposits.

In the disclosed embodiments, the adhesive deposits may advantageously incorporate a drug delivery system and/or provide improved repositionability of the tape or bandage.

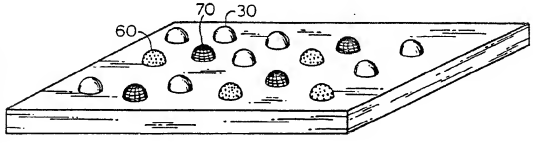

FIG. 8

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DISCONTINUOUS ADHESIVE SURFACE

This invention relates in general to adhesive tapes and especially medical bandages for application to the skin.

During the past decade, major advances have been made in medical adhesive tapes and the literature is replete with processes and compositions for making such tapes. Yet a tape or bandage in which the adhesive is sufficiently aggressive for good adhesion while not damaging to skin is still elusive.

The prior art medical tapes can be categorized into two main groups: rubber-based or acrylic adhesives on a cloth or other suitable backing material. Rubber-based adhesives enjoyed market dominance until the 60's. Since then acrylic adhesives have become more popular. The primary reason for the popularity of acrylic adhesives has been the so-called "hypoallergenic" factor. Rubber-based adhesive tapes contain components such as pale crepe or synthetic rubber, natural resins, antioxidants, plasticizers, filling and colouring agents, many of which come from plant sources which have the inherent problem of source variation and the potential for introduction of irritant and sensitizing agents.

However, the hypoallergenic factor between rubber-based and acrylic adhesives may be overemphasized since skin sensitivity is primarily correlated to the physical process of wearing a tape or bandage which causes changes in the cohesion of skin cells resulting in injury. The type and severity of skin injury varies with the length of time a bandage is worn. The longer a bandage is worn the more hydrated and thus macerated the outer layer of the stratum corneum, the outermost skin layer, becomes. Under moist conditions, the adhesion between the tape adhesive layer and the outermost skin layers is far greater than the internal strength of the stratum corneum resulting in deep and irregular fractures within the layers of the stratum corneum upon removal of the tape. Accordingly, when a bandage is worn for short intervals of time, such as a few minutes, the upper layers of the stratum corneum do not gain significant fluid from the underlying skin layers resulting in brittle-fracture of the surface of the skin. On the other hand, when a bandage is placed on the skin for longer intervals of time, fluid builds up in the upper layers of the stratum corneum which in turn plasticizes these layers and reduces the elastic modulus and increases the extensibility of skin leading to an increase in the work of fracture and increased stress relaxation of the stratum corneum. The net effect is deeper skin fractures.

Trauma to the skin is lessened when adhesive tapes are constructed to allow normal skin moisture to move through the adhesive and the backing into the environment. Accordingly, the medical tape industry has responded by introducing acrylic adhesives with hydrophilic properties and a high moisture transmission rate spread on a fabric or a nonwoven backing. These tapes advantageously maintain the normal moisture content of the outermost skin layers when intact, thereby causing fracture lines to develop near the surface, in the region of the naturally desquamating layers. Consequently only small amounts of stratum corneum are torn when the tape is removed. However, while these tapes advantageously allow for repeated use of a tape with minimal trauma to the skin, they do have disadvantages.

The major disadvantage of acrylic adhesives with hydrophilic properties, is that they may not adhere well. Thus, while they do not disrupt the integrity of the skin and cause infection, they do fall off, thereby exposing the wound directly to environmental contaminants which can cause infection as well as contact with objects which can be painful or injurious.

In summary, the prior art offers a choice between aggressive adhesive tapes that cause disruption to the skin's integrity and thereby increase the likelihood of infection upon removal, or minimally aggressive adhesive tapes that are hydrophilic and allow for moisture transmission, yet easily fall off and promote injury or infection.

While this dilemma remains unsolved, the prior art has offered incomplete solutions, representative of which is U.S. Patent No. 3,811,438 to Economou. This patent lessens moisture accumulation and thereby increases ventilation by proposing adhesive tapes and bandages comprising a flexible backing with an adhesive portion distributed and adhered thereon in the form of adhesive strips extending the entire width of the backing material, alternately spaced with strips of lesser adhesiveness which strips are generally of a width less than each adjacent layer of adhesive, with each strip having a minimum width of about 0.02 inches (0.508 mms).

While strips of adhesive decrease the surface area in contact with the skin and may thereby decrease the area of injury to the skin upon removal, they minimally lessen the severity of internal injury to the skin because the adhesive strips do run along the entire width of the bandage which upon removal causes a continuous fissure in the interior layers of the skin equal to the width of the bandage. Thus even though the surface area of injury is reduced to the area under the adhesive

strips, the severity of injury to the internal skin layers remains the same along the width of the bandage since crack propagation is not prevented along this axis.

Similarly, U.S. Patent No. 2,399,545 of Davis cescribes a tape wherein the adhesive material is applied in various linear patterns of spaced bands reducing the amount of adhesive material up to 50%. Again, the various linear patterns are continuous strips anc therefore cause stratum corneum fractures upon removal.

It is therefore the object of this invention to provide an improved adhesive tape that adheres well to the skin while causing minimal disruption to the integrity of the skin upon removal therefrom.

In accorcance with the present invention, the disadvantages of the prior art are overcome by having the adhesive applied to the backing or other substrate in the form of tiny individually spaced deposits.

In the preferred embodiment, the adhesive is applied in a geometric pattern, most preferably in the form of generally hemi-spherical small separate discrete deposits.

In one form of the invention in an article of manufacture comprising a backing material carrying a discontinuous adhesive layer on a surface thereof, the discontinuous adhesive layer consists essentially of spaced small individual adhesive deposits.

The invention also extends to an adhesive tape comprising a backing material having on one surface thereof a patternwise deposition of small spaced pressure sensitive adhesive particles.

The invention further extends to an adhesive bandage comprising a backing material carrying on one surface thereof an absorbent pad for placement as a wound dressing and an adhesive layer for adhering the said bandage to the skin, the said adhesive layer consisting essentially of individually spaced small adhesive deposits.

The invention further extends to an article of manufacture comprising a vapour and oxygen-permeable backing material carrying a discontinuous adhesive layer on one surface thereof, the discontinuous adhesive layer consisting essentially of substantially uniformly spaced small individual pressure sensitive medical grade adhesive deposits.

The invention further extends to an adhesive bandage comprising a vapour- and oxygen-permeable backing material carrying on one surface thereof an absorbent pad for placement as a wound dressing and a medical grade adhesive layer for achering the said bandage to the skin, the said adhesive layer consisting essentially of substantially uniform individually spaced small adhesive deposits arranged in a geometric pattern.

The said adhesive deposits may be uniformly or substantially uniformly spaced. The said adhesive deposits may be arranged on the said backing material in a geometric pattern. The said adhesive deposits may be of varying size. The said adhesive deposits may be substantially spherical. The said adhesive deposits may be more densely positioned along at least one edge than in the central portion of the said backing material.

The said adhesive may be acrylic or rubber-based adhesive. The said adhesive preferably comprises a pressure-sensitive medical grade adhesive. The said adhesive deposits may comprise a drug and/or cosmetic release mechanism. The said achesive deposits may contain medicinal and/or cosmetic agents. The said adhesive deposits may contain one or more compatible or incompatible medicinal and/or cosmetic agents.

The said backing material may be vapour- and oxygen-permeable.

The deposits are preferably configured so that the area of the surface, the contact surface, of the deposit remote from the surface, the attachment surface, by which the deposits are attached to the backing is much smaller.

Conveniently this can be achieved by making the deposits from substantially spherical particles which on adherence to the backing assume a rounded or generally hemispherical shape. The contact surface is thus theoretically a point but in practice is a rounded area due to compression of the adhesive deposit and conformation of the skin to the rounded surface of the deposit.

Clearly other shapes than spherical or rounded could be effective the aim being to keep the contact surface as small as possible commensurate with good attachment between the deposit and the backing.

The other factor which is critical to achieving good use properties for medical bancages and tapes is the open area of the backing preserved between the adhesive deposits.

The percentage open area (OA) is defined herein as the ratio between the plan area of the backing (AB) minus the sum of the plan areas of the attachment surfaces of the deposits (EAD) to (AB), i.e.

OA = (AB - EAD)/AB %.

The open area must be such as to ensure that the adhesive particles remain separate and discrete or substantially so. The value of OA is atleast 10% e.g. atleast 20% but may be higher e.g. as high as 65% or more e.g. up to 80% or 95% or 98%, e.g. 10% to 95% or 20% to 80% or 20% to 65%, e.g. 50 to 60%.

The adhesive products contemplated by this invention enjoy the advantage of non-occlusion, breathability, reduced skin damage upon removal,

lowered material cost, improved repositionability, as well as providing a substrate for non-occlusive controlled release of medicaments, if desired.

The invention may be put into practice in various ways and a number of specific embodiments will be described by way of example to illustrate the invention with reference to the accompanying drawings, in which:

Figure 1 shows a diagrammatic plan view of a conventional adhesive bandage;

Figure 2 shows a diagrammatic plan view of a prior art adhesive bandage with adhesive strips;

Figure 3 shows a plan view of one embodiment of the invention;

Figure 4 shows an enlarged view of one of the preferred embodiments;

Figure 5 shows an enlarged view illustrating a single adhesive small separate discrete deposit in the process of being removed from the skin;

Figure 6 shows an enlarged perspective view of adhesive small separate discrete deposits after removal from the skin;

Figure 7 shows a side elevation view of a preferred embodiment of the invention particularly useful for repositioning;

Figure 8 shows a perspective view of a preferred embodiment of the invention depicting the incorporation of a drug release mechanism; and

Figure 9 shows a plan view of still a further embodiment of the invention.

Figure 1 depicts a conventional adhesive bandage 10 comprising an absorbent pad 12 (usually a gauze material), a backing 14, and a continuous adhesive layer 16. As shown, the pad 12 is typically centrally disposed along the length of the adhesive layer to provide sufficient adhesive surface on either side thereof for adhering the bandage to the skin.

Figure 2 depicts a prior art adhesive bandage 10 of the type described in the aforementioned U.S.P. 3,811,438, wherein the adhesive is applied in strips 18 to the backing 14.

Figure 3 illustrates a novel adhesive bandage of this invention of the type generally referred to in the art as a finger bandage, a first-aid bandage or a strip bandage. As shown therein, the adhesive is applied to the backing 14 of bandage 10 in the form of individual small discrete deposits 30. While these deposits may be randomly distributed on the backing, Figure 3 illustrates the preferred form of this invention wherein the deposits are arranged over at least a substantial portion of the backing in a geometric configuration.

The backing material 14 may be any of the flexible materials heretofore employed for bandages, e.g. cloth, paper, plastic, strand-reinforced backings or laminates. Preferably, it is either made of a vapour and oxygen permeable material or, e.g. in the case of plastic backings, is perforated to render it permeable to vapour and oxygen. Such backings, which are per se known for bandages, are generally referred to in the art as "breathable".

The adhesive compositions which may be employed are those which preferably are dermatologically acceptable.

By way of illustration, it may be any of the rubber-based or acrylic adhesives of the type generally referred to in the art as being "medical grade" adhesives with a low degree of skin irritation i.e. lower mechanical, chemical and allergic irritation. Preferred are the acrylic adhesives, e.g. comprising a terpolymer of acrylic acid, an acrylate and an acetic acid ester such as ethyl acetate. However, as previously mentioned, rubber-based adhesive comprising a natural or synthetic rubbery elastomer and a tackifying resin are also contemplated, preferably so long as they are dermatologically acceptable.

The mean particle size or diameter of the individual adhesive deposits to be employed as well as the spacing between individual deposits will in part be dependent upon the aggressiveness of the particular adhesive formulation selected and will in part be dependent upon the desired tack and adhesion properties for the particular type of tape or bandage. The particles may have a diameter or maximum transverse dimension of on the order of from about 20 mils (0.508 mms) to about 10 mils (0.254 mms) may be employed (e.g. 250 to 500 microns). The particles may be deposited so as to provide on the order of from about 200 to about 1000 or about 200 to about 7000, especially about 900 to about 4900, adhesive particles per square inch (30 to 155, 30 to 1100 or 140 to 760 per square cm) of surface area. By way of illustration and as preferred embodiments, however, particles may be deposited by use of screens on the order of 30 to 70 mesh (which have 30 openings by 30 openings per square inch up to 70 openings by 70 openings per square inch). The deposits may provide a weight of adhesive of from about 30 to about 10 grams per square yard (36 to 12 grams per square metre) of surface area.

While the particular particles may be of various shapes, as will be discussed hereinafter in more detail, generally spherical particles which assume a hemispherical or rounded shape on the backing are most preferred.

The attachment of the adhesive deposits 30 to the backing 14 may be made by activating the adhesive in any of the known ways such as by solvent, heat or pressure. The preferred embodiment of the invention comprises a hot melt pressure sensitive adhesive, as it allows for the highest degree of precision in the placement of the adhesive. Among the hot melt application equipment

that may be used, mention may be made of slot orifice coaters, roll coaters, extrusion coaters, screen process printing and gravure coating. The latter two are the preferred method for applying the inventive adhesive pattern due to their precision. Both gravure and screen printing are well known and per se comprise no part of this invention. Accordingly, they need not be described in great detail.

Figure 3 further depicts the preferred embodiment of the invention, namely the spherical adhesive deposits, 30, which are essentially hemispherical when located on the backing. Test results have illustrated that hot melt pressure sensitive adhesive applied in a discontinuous pattern of dots, has numerous advantages among them non-occlusion and breathability, reduced skin damage, lower manufacturing cost, improved repositionability as well as being an excellent substrate for non-occlusive controlled release of medicaments as illustrated in Figure 8. Medical bandages of the present invention include wound dressings, finger bandages, blister and contusion prevention bandages and athletic tape. Industrial tapes in accordance with the present invention include reinforcement tape, harness tape, duct tape and masking tape.

The following sets forth two examples of manufacture of a medical tape and a control and the corresponding test results.

EXAMPLE I

Microsize Backing - non woven sized with acrylic polymer. Rubber-based Hot Melt Pressure Sensitive Adhesive hereafter (HMPSA).
Hot screen printed on a Kraemer Coating apparatus with a 60 mesh screen (which has 60 openings by 60 openings per square inch). Dot pattern at 11 gram/yd^2 (13 gram/m^2).
Achesive dots approximately .012" (0.30 mm) diameter.
Adhesive dot distribution 3600/in^2 (558/cm^2). Open area: 59%
Adhesion to Steel 17.7 oz/in (197.5 gram/cm). Tack 150 g.
Porosity
Microsize without adhesive, 0.180 sec/100cc/in^2 (0.028 sec/100cc/cm^2).
Microsize with adhesive dots, 0.197 sec/100cc/in^2 (0.031 sec/100cc/cm^2).

EXAMPLE II

Microsize Backing - non woven sized with acrylic polymer.Rubber-based HMPSA Adhesive.
Hot screen printed on a Kraemer Coating apparatus with a 50 Mesh Screen (which has 50 openings by 50 openings per square inch). Dot pattern at 15 gram/yd^2 (18 grams/m^2).
Adhesive dots approximately 0.015" (0.38 mm) diameter.
Adhesive dot distribution about 2500/in^2 (388/cm^2).
Open area: 56%
Adhesion to Steel: 56 oz/in (625 gram/cm).
Tack: 140 g.
Porosity
Microsize: without adhesive, 0.181 sec/100cc/in^2 (0.028 sec/100cc/cm^2).
Microsize: with adhesive cots, 0.253sec/100cc/in^2 (0.039 sec/100cc/cm^2).

EXAMPLE III (Control)

Microsize Backing.
Rubber based HMPSA.
Adhesion to Steel: 70.3 oz/in (785 gram/cm).
Tack: 591 g
Porosity
Microsized without adhesive, 0.181 sec/100cc/in^2 (0.028 sec/100cc/cm^2).
Microsized with continuous adhesive film 9.25 sec/100cc/in^2 (1.43 sec/100cc/cm^2).

These examples demonstrate a positive correlation between mesh size and hence adhesive dot diameter, and porosity. Since an inverse relationship exists between tape porosity and skin maceration, one may deduce that the greater the degree of porosity the less skin damage will occur. The examples of manufacture illustrate a marked increase in porosity of 0.197 sec/100cc/in^2 (0.031 sec/100cc/cm^2) and 0.253 sec/100cc/in^2 (0.039 sec/100cc/cm^2) as opposed to 9.25 sec/100cc/in^2 (1.43 sec/100cc/cm^2) of a solid rubber based adhesive. Simply stated it takes 0.197-0.253 seconcs for 100 cc of air to be forced through a discontinuous adhesive film, tape or bandage, as opposed to 9.25 seconds for a continuous adhesive film, tape or bandage. Thus the invention reduces exposure of skin to moisture and consequently reduces skin maceration and skin damage upon removal of the tape or bandage.

The examples further illustrate a marked decrease in adhesion, 17.7 oz/in (197.5 gram/cm) and 56 oz/in (625 gram/cm) as opposed to 70.3 oz/in (785 gram/cm) of a continuous rubber based adhesive film, tape or bandage. Notably this decrease is due to the decreased amount of adhesive used in the discontinuous as opposed to a continuous adhesive surface as the type of adhesive remained constant. However this decrease in adhesion is offset by the invention's ability to incorporate a much more aggressive adhesive.

A continuous adhesive surface is restricted to less aggressive adhesives to minimize skin damage upon removal whereas a discontinuous adhesive surface by nature of reduced skin/adhesive contact may employ a much more aggressive adhesive. Thus even though the amount of adhesive used is decreased, the adhesive strength need not be decreased. In sum, the invention advantageously allows one to use a smaller amount of adhesive yet a more aggressive type of adhesive so as to be competitive with the adhesive strength of a prior art continuous adhesive film, tape or bandage. Naturally aside from the usual effect of temperature, moisture, and oil presence on the surface to be bonded, hot screen printed HMPSA performance on skin will depend on:

1. Deposit Size (controlled by mesh size and melt viscosity).

2. Deposit Distribution (screen design).

3. Type of HMPSA (softness, cohesive strength, aggressiveness).

4. Type of Backing - Smooth backing requires less adhesive than very rough backing.

5. Anchorage of adhesive to backing.

Thus, each specific backing will require its own adhesive design and/or HMPSA for it to function satisfactorily.

Figure 4 depicts one enlarged embodiment of the invention namely four hemi-spherical deposits of adhesive. This arrangement of dots provides over 50% more effective contact area with the skin than planar coating while allowing for 21% adhesiveless space to reduce the amount of skin damage.

Figure 5 shows an enlarged view of a single hemi-spherical adhesive deposit, to illustrate the mechanism whereby a hemi-spherical structure reduces skin damage upon removal of the article. Area B refers to the shear force (force that is tangential to the surface) zones while area A refers to the tensile force (force that is normal to the surface) zone. Reference 40 is the skin. When the bandage or tape is removed skin failure occurs primarily at the microdot base i.e. area A, thereby limiting the extent of damage to the contact area and minimizing crack propagation to the surrounding area. In other words, by utilizing hemi-spherical adhesive deposits, one takes advantage of the natural compliance of the outer layers of the skin which confines skin failure to areas of contact thereby reducing the length of time and thus intensity of the force exerted upon removal. Thus both the area as well as the depth of skin damage is reduced. Notably the deeper the skin fracture the more physiological processes and anatomical structures can be damaged. Data suggests that the force necessary for removing a prior art bandage may even propagate through the epidermis and into the dermis, the underlying skin layer, causing even more extensive injury.

Figure 6 further depicts one of the advantages of the inventions namely the decreased skin damage by offering a microscopic view of deposit 30 after having been removed from skin 40. The light area denotes Skin 40. Accordingly adhesive attachment and thus skin damage is restricted to areas of contact and primarily area A.

Figure 7 illustrates a further embodiment of the invention particularly designed to improve repositionability. As is used herein and understood in the adhesive art, "repositionability" is defined as the performance of an adhesive relating to its potential for re-adhesion to a substrate after removal. This performance is a function of the amount of unused adhesive available for contact upon a further application of the adhesive to a substrate.

In one preferred embodiment for improved repositionability, as shown in Figure 7, two arrays or patterns of adhesive 16 are printed on the same backing 14. One array contains larger size dots 30-(a) of greater dimension than the other array of dots 30(b). Upon first application, the dots 30(a) make initial contact with the substrate. Upon repositioning following removal from the substrate, although the adhesive quality of dots 30(a) is diminished, the small dots 30(b) will provide the primary source for adhesion.

Various other design possibilities utilizing a height gradient in the adhesive deposits will be readily suggested to those skilled in the art in view of the foregoing description of Figure 7. Accordingly, it is expressly understood that other design patterns utilizing adhesive deposits of varying sizes and/or shapes to constitute a non-uniform adhesive deposit surface area are contemplated.

Figure 8 depicts the invention's incorporation of a controlled drug or cosmetic release mechanism. By incorporating a topical agent directly into the melted adhesive the same manufacturing process may be utilized for medicament or cosmetic containing adhesive deposits 60, as for adhesive deposits alone 30. The release mechanism may be one of passive diffusion or melting upon contact with the skin. The former process has the advantage of being non-occlusive. This technology may advantageously be extended to the delivery of more than one active ingredient to the skin which is particularly attractive when such ingredients react with one another if housed in the same matrix or when different drug or cosmetic release rates are desired or warranted. In addition, one adhesive deposit 60 may advantageously house the drug or cosmetic while another 70 may house the transport vehicle or a skin conditioner to counter the effect of irritating drugs, or a drug activator.

Figure 9 depicts a further embodiment of the

invention. Here spherical adhesive deposits 30, are printed in different densities on a given backing. One may for instance apply higher density near the tape edges where shear forces may cause failure of the tape and a lower density as one approaches the central portion to allow skin movement and maximize air and water vapour permeability.

The open area of the pattern at the edges of the bandage is about 80% whilst that in the more open inner region is about 98%.

The above described invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are to be considered in all aspects as illustrative and unrestrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description and all changes which come within the meaning and range of equivalency are, therefore, intended to be embraced therein.

Claims

1. In an article of manufacture comprising a backing material carrying a discontinuous adhesive layer on a surface thereof;
the improvement wherein the discontinuous adhesive layer consists essentially of spaced small individual adhesive deposits.

2. An article in the form of an adhesive tape comprising a backing material having on one surface thereof a patternwise deposition of small spaced pressure sensitive adhesive particles.

3. An article in the form of an adhesive bandage comprising a backing material carrying on one surface thereof an absorbent pad for placement as a wound dressing and an adhesive layer for adhering said bandage to the skin in which the said adhesive layer consists essentially of individually spaced small adhesive deposits.

4. An article of manufacture comprising a vapour and oxygen-permeable backing material carrying a discontinuous adhesive layer on one surface thereof, in which the discontinuous adhesive layer consists essentially of substantially uniformly spaced small individual pressure sensitive medical grade adhesive deposits.

5. An article in the form of an adhesive bandage comprising a vapour- and oxygen-permeable backing material carrying on one surface thereof an absorbent pad for placement as a wound dressing and a medical grade adhesive layer for adhering said bandage to the skin;
the improvement wherein said adhesive layer consists essentially of substantially uniform individually spaced small adhesive deposits arranged in a geometric pattern.

6. An article as claimed in any one of Claims 1 to 5 in which the said adhesive deposits are of varying size.

7. An article as claimed in any one of Claims 1 to 6 in which the said adhesive deposits are substantially hemi-spherical.

8. An article as claimed in any one of Claims 1 to 7 in which the said adhesive deposits are more densely positioned along at least one edge than in the central portion of the said backing material.

9. An article as claimed in any one of Claims 1 to 8 in which some of the said adhesive deposits contain a first material and others of the adhesive deposits contain other materials which may or may not be compatible with each other or with the first material, incompatible materials being located separata from each other in different deposits.

10. An article as claimed in any one of Claims 1 to 8 in which the said adhesive deposits contain one or more compatible or incompatible medicinal and/or cosmetic agents.

11. An article as claimed in any one of Claims 1 to 10 in which the said adhesive deposits are arranged on the said backing material in a geometric pattern.

12. An article as claimed in any one of Claims 1 to 11 in which there are 30 to 1100 deposits of adhesive per sq. cm.

13. An article as claimed in any one of Claims 1 to 12 in which the deposits leave 10% to 95% open area which is adhesiveless on the backing sheet.

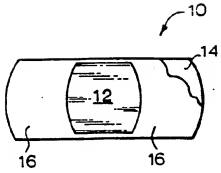

FIG. 1

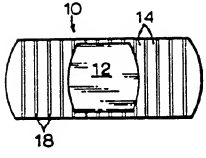

FIG. 2

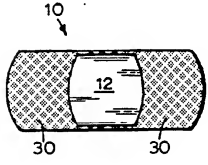

FIG. 3

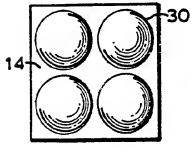

FIG. 4

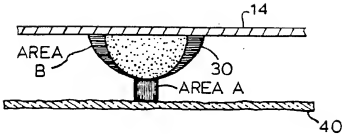

FIG. 5

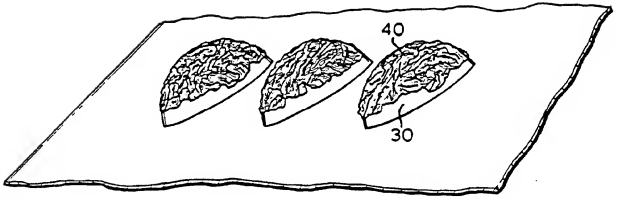

FIG. 6

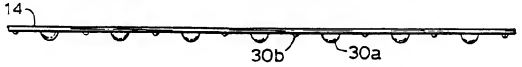

FIG. 7

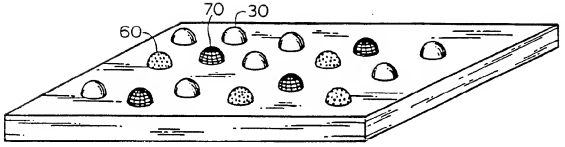

FIG. 8

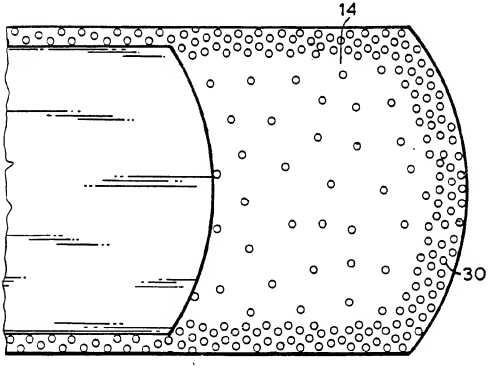

FIG. 9

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 89 30 7753

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	EP-A-0 170 010 (BEIERSDORF) * Claims 1,4; page 5, lines 14-19; figure 1; page 8, lines 8-20 *	1,2,7, 12,13	A 61 F 13/02 C 09 J 7/00
X	GB-A-2 081 101 (KIMBERLY-CLARK) * Claim 1, figure 1 *	1,3,11, 13	
P,X	EP-A-0 288 749 (LOHMANN) * CLaim 3 *	1,3,4	
A	GB-A-2 119 656 (KIMBERLY-CLARK) * Page 2, lines 1-8 *	1,3,11	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

A 61 L
A 61 F
C 09 J

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	20-09-1989	PELTRE CHR.

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